PAN-PACIFIC ENTOMOLOGIST
Vol. 55, No. 2, pp. 127–146

SOME LARVAE OF ORTHOCLADIINAE, CHIRONOMIDAE FROM BROOKS RANGE, ALASKA WITH PROVISIONAL KEY (DIPTERA)

LARRY J. TILLEY

Water Resources Division, U.S. Geological Survey,
Menlo Park, CA, 94025

Reconnaissance samples of benthic invertebrates from two arctic-alpine streams, the Dietrich and Atigun Rivers, Alaska were dominated by Chironomidae larvae (Slack and others, 1976, 1977, 1979). In both rivers the headwaters were dominated by the chironomid subfamily Diamesinae whereas Orthocladiinae predominated further downstream. Although chironomids are known for their abundance in arctic freshwaters (Downes, 1962, 1964; Hobbie, 1973), little taxonomic information is available for Alaskan species. The present report describes and provides a key for the larvae of eleven taxa in the subfamily Orthocladiinae. A similar report on the Diamesinae and a single Podonominae from the same area is in preparation.

The Atigun River flows northward and the Dietrich River flows southward, from the Continental Divide in the Brooks Range. The trans-Alaska pipeline corridor traverses both drainage basins (Fig. 1), but the collections on which this study is based were made in August 1971 before the start of pipeline and road construction.

Methodology

Samples were preserved in 40 percent isopropyl alcohol when collected, and were later separated in the laboratory from detritus by sugar flotation (Anderson, 1959). The introductory keys for chironomid larvae prepared by Mason (1973) and Beck (1968) were most useful because they indicated the morphological characters of greatest value in the separation of species. Other helpful keys were those of Johannsen (1937), Chernovskii (1949), Roback (1957) and Pankratova (1970, in Russian).

The chironomid larvae were first sorted into visually distinct groups. A sample from each group was prepared for microscopic examination by bleaching in hot 10 percent KOH (potassium hydroxide) solution to dissolve soft body tissues. Each specimen was then placed ventral side up on a glass slide in CMC-10[1] mounting medium and pressed under a 12 mm diameter coverslip (Greeson and others, 1977). The illustrations for each taxon are tracings from Polaroid photomicrographs. The heavy backing of the Polaroid paper was carefully peeled from the prints and the insect parts traced using

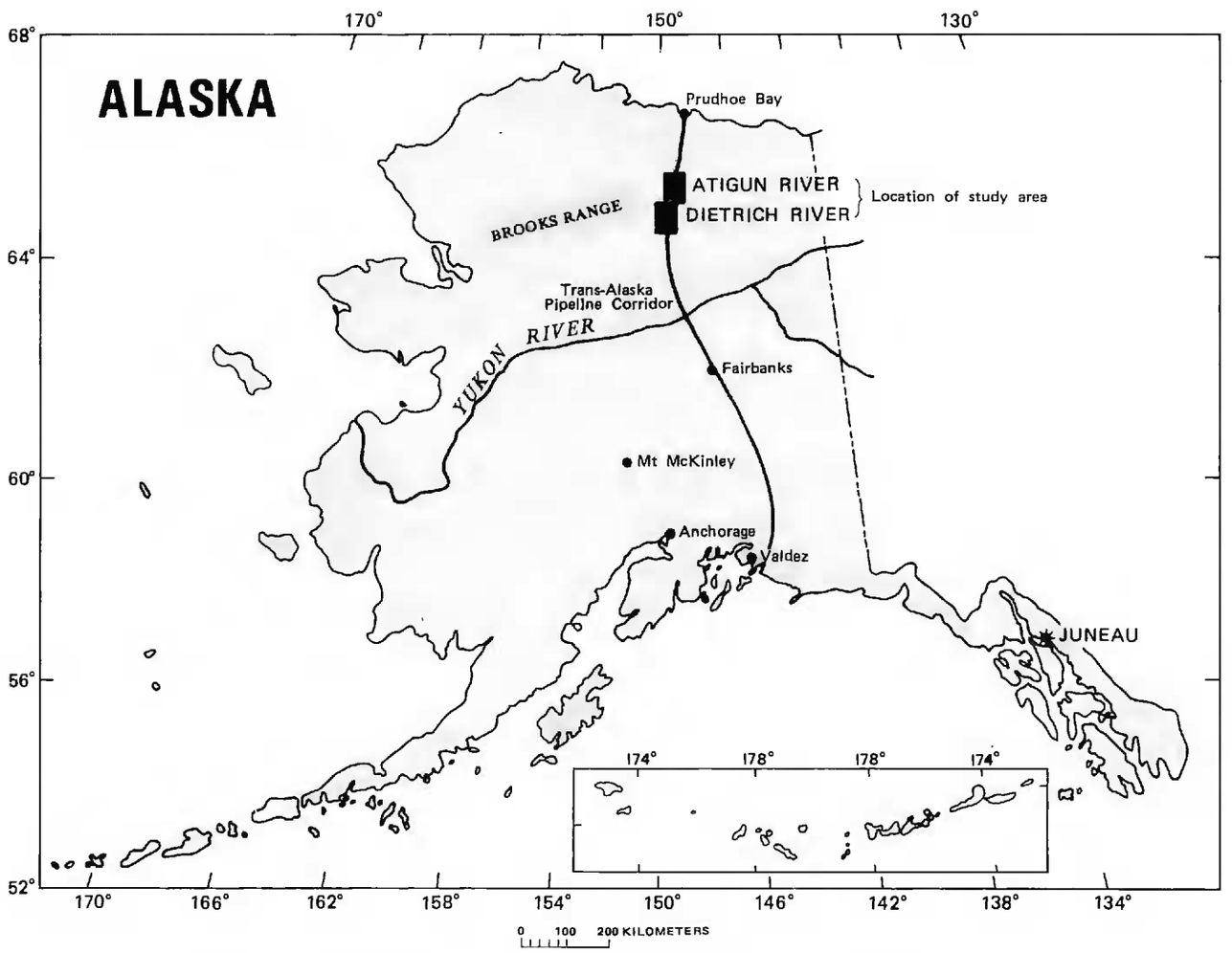

Fig. 1. Location of the Dietrich and Atigun River basins in Alaska.

a light table. Larval measurements were made to the nearest micrometer with a calibrated Whipple disc grid in the ocular of a light compound microscope.

Observations and measurements of the following larval characteristics were used to separate taxa: 1. Antenna: length of each segment, ratio of length of first segment to its width ("ALAW"), length of first segment to that of remaining four segments ("AR"). 2. Labial plate: relative size, shape, and length of midtooth or midteeth; bifurcation of midtooth or number of midteeth; comparison of the width, or length of first pair of lateral teeth to midtooth or midteeth, and total number of pairs of lateral teeth. 3. Mandibles: number of teeth and their relative size distribution. 4. Premandibles: number of digits, their relative size and appearance. 5. Preanal papillae: presence or absence, length versus width. 6. Preanal papillar bristles: length, number, and location.

Instars were estimated using sizes of various morphological features, including body length, head capsule length, and width and length of first antennal segments. To illustrate variability of the averages, standard devia-

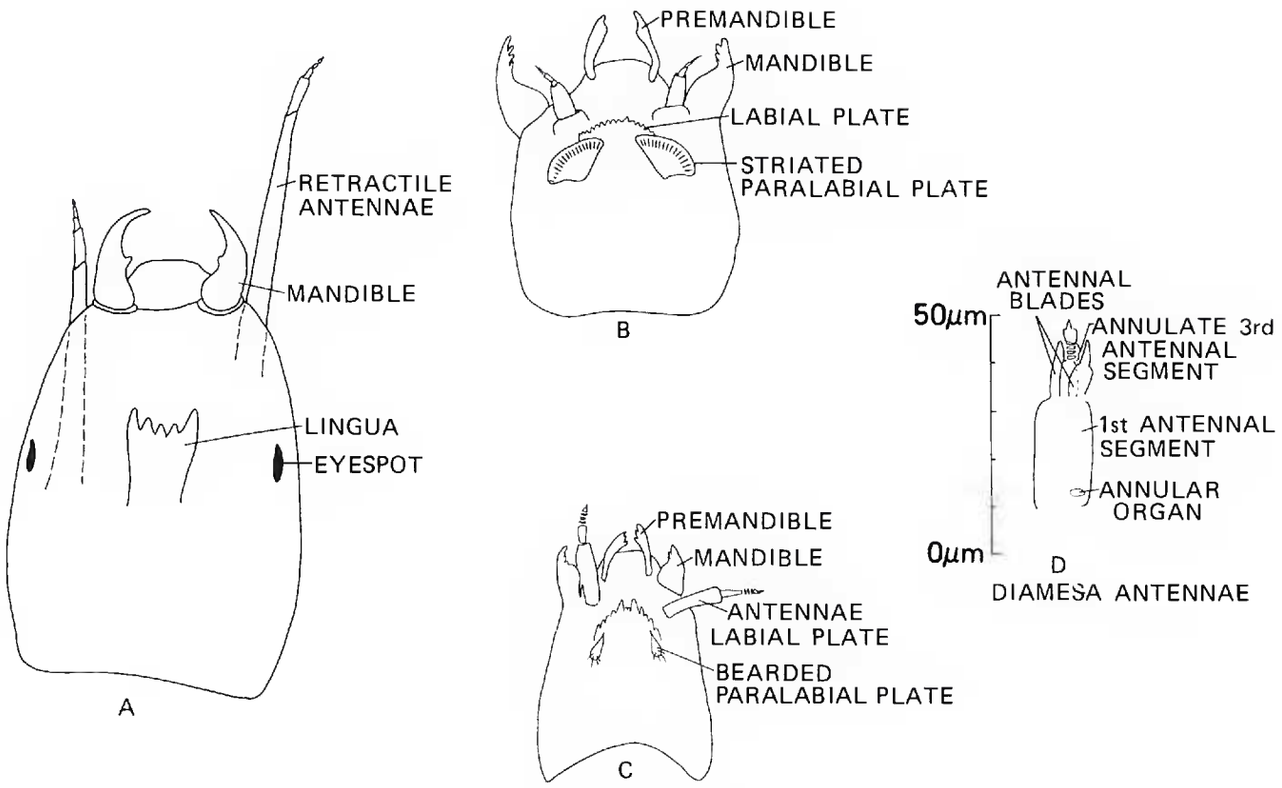

Fig. 2. Head capsule structures (ventral view) used in the identification of larval Chironomidae. (A) Tanypodinae, (B) Chironominae, (C) combined Orthocladiinae and Diamesinae, A, B and C not drawn to scale, (D) antenna of *Diamesa latitarsis* (var. 1) to scale.

tions are reported using the symbol "S.D." Specimens with conspicuously swollen thorax areas were considered to be fourth (last) instars.

It was not possible to assign specific names to many of these larvae, nor is it known whether or not a particular taxon has been described. Species descriptions are based on adults and the immature stages may not be known. The objective of the field study was to enumerate the taxa and their relative abundances in samples of the benthic fauna. Hopefully the information in this paper, which made it possible to distinguish taxa, will be of use to the taxonomist interested in naming adult chironomids and to the ecologist studying benthic invertebrates. Specimens are stored at the U.S. Geological Survey, Western Region Headquarters in Menlo Park, California.

Key to the Common Subfamilies of Chironomidae Larvae and to the Genera of Some Orthocladiinae From Reconnaissance Samples, Dietrich and Atigun Rivers, Brooks Range, Alaska, August 1971

1. Head capsule with fork-shaped lingua; antennae long, often ⅓ length of head or longer, retractile (Fig. 2A) ..... Tanypodinae
   Head capsule without fork-shaped lingua, labial plate present (Fig. 2B and 2C); antennae not retractile 2

2. Premandible absent; preanal papillae at least 3 times longer than wide ..... Podonominae
   Premandibles present (Fig. 2B and 2C) 3
3. Paralabial plates present, usually large, conspicuous and striated (Fig. 2B) ..... Chironominae
   Paralabial plates usually absent, if present paralabial plates without striations, although sometimes bearded (Fig. 2C) 4
4. Third segment of antenna annulate (ringed) (Fig. 2C and 2D); premandibles usually with more than three digits ..... Diamesinae
   Third segment of antenna not annulate; premandibles usually with one or two and sometimes three digits 5
5. Generally freshwater, occasionally terrestrial ..... Orthocladiinae (exclusive of Clunionini) 6
   Generally marine ..... Telmatogetoninae and the Orthocladiinae tribe Clunionini
6. Antennae at least one-half as long as head; body less than 5 mm long; antennae four segmented (Fig. 13A) ..... *Corynoneura* (Winnertz) Edwards Alaska sp. I (Fig. 13)
   Antennae less than one-half as long as head; body longer than 5 mm 7
7. Labial plate with an even number of teeth; midteeth may appear truncate 8
   Labial plate with an odd number of teeth; midtooth rarely truncate 12
8. Premandibles with more than one lobe; usually two or three (Figs. 11D, 12D) ..... *Chaetocladius* (Kieffer) 9
   Premandibles with a single broad, apical lobe (Fig. 3D) ..... *Eukiefferiella* Thienemann 10
9. Midteeth of labial plate longer than first pair of lateral teeth (Fig. 10B) ..... *Chaetocladius* Alaska sp. I (Fig. 10)
   Midteeth of labial plate short, about one-half as long as first pair of lateral teeth (Fig. 11B) ..... *Chaetocladius* Alaska sp. II (Fig. 11)
10. Midteeth of labial plate rounded apically (Fig. 3B); mandibles usually with one or three long serrations on basal inner margin (Fig. 3C) ..... *Eukiefferiella* Alaska sp. I (Fig. 3)
    Larva with characters not as above 11
11. Midteeth of labial plate not truncate; preanal papillae present, about as long as wide; preanal papillary bristles long, about 600 μm long, in fourth instar (Fig. 5B and E) ..... *Eukiefferiella bavarica* Goetghebuer (Fig. 5)
    Midteeth of labial plate usually truncate; preanal papillae absent or

nearly so; preanal papillary bristles short and weak, about 100 μm long in fourth instar (Fig. 4B and E) ..... *Eukiefferiella cynaea* Thienemann (Fig. 4)

12. Paralabial plates present; premandibles with three lobes (Fig. 12B and D) ..... *Parakiefferiella* Thienemann, Alaska sp. I (Fig. 12)

Paralabial plates absent; premandible with less than three lobes .. .. Genus *Orthocladius* Kieffer 13

13. Midtooth of labial plate about two times as wide as first lateral tooth; premandible with cleft near apical end; location of Lauterborn organs uncertain; labial plate with six pairs of lateral teeth ..... *Orthocladius* s. str. (Fig. 9)

Labial plate with more than six pairs of lateral teeth; or antennae with sessile Lauterborn organs at third antennal segment (Fig. 6A) 14

14. Labial plate with six pairs of lateral teeth; sessile Lauterborn organs at third antennal segment (Fig. 6A) .... *Orthocladius* (*Euorthocladius*) Thienemann Alaska sp. I (Fig. 6)

Labial plate with more than six pairs of lateral teeth 15

15. Midtooth of labial plate narrow, about as wide as first lateral tooth; margin of labial plate concave (Fig. 7B); mandibles with all teeth of equal length (Fig. 7C) .... *Orthocladius* (*Euorthocladius*) Thienemann Alaska sp. II (Fig. 7)

Midtooth of labial plate broad, about three times as wide as first lateral tooth, labial plate convex (Fig. 8B); apical tooth of mandible much larger than other mandibular teeth (Fig. 8C) .... *Orthocladius* (*Euorthocladius*) Thienemann Alaska sp. III (Fig. 8)

Orthocladiinae

Eukiefferiella Thienemann

Larva, Goetghebuer 1932, in Pankratova 1970.

Eukiefferiella Alaska sp. I (Fig. 3)

Three instars determined; body length of largest instar (fourth) 2.8–6.0 mm (average 4.1 mm, n = 4, S.D. = 1.41 mm); of intermediate instar (third) 1.9–4.0 mm (average 2.78 mm, n = 49, S.D. = 0.54 mm); and of smallest instar (second) 1.6–3.6 mm (average 1.9 mm, n = 22, S.D. = 0.41 mm). Head capsule of largest instar average 0.33 mm long and 0.21 mm wide (n = 12, S.D. = 0.06 and 0.05 mm). Body color of preserved specimens yellow during first few weeks of storage, after storage with differing amounts of leaf and other detritus, many were brown. Head capsules brown, darker brown with longer storage.

Length of antennal segments of largest instar (fourth) (Fig. 3A), 50: 14:

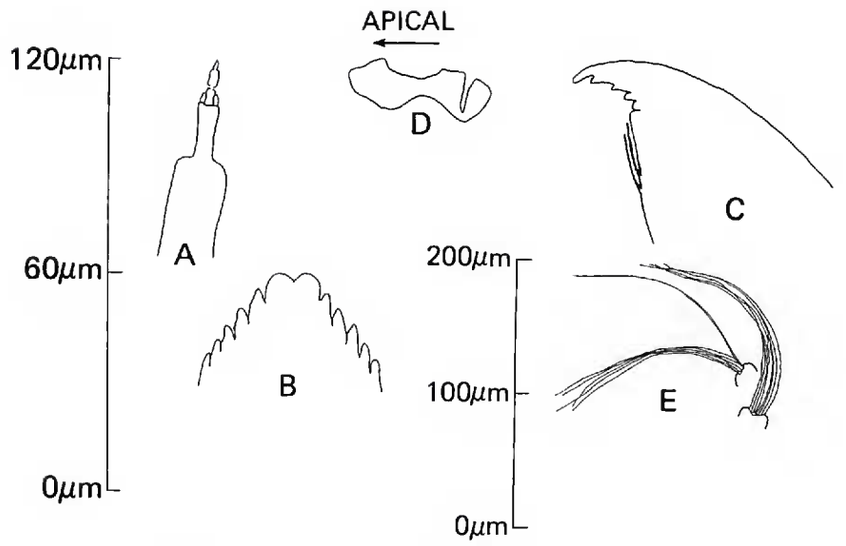

Fig. 3. *Eukiefferiella* Alaska sp. I. (A) antennae, (B) labial plate, (C) left mandible, (D) right premandible, (E) preanal papillae and papillar bristles.

5: 5: 4 μm (n = 4, S.D. = 7.3: 1.7: 0.96: 0.96: 0.82 μm); width of first segment 19 μm (n = 5, S.D. = 2.39 μm); AR = 1.86, S.D. = 0.30, ALAW = 2.64, S.D. = 0.29. Length of antennal segments of intermediate instar (third) 24: 11: 3: 5: 4 μm (n = 60: 57: 57: 57: 57, S.D. = 3.65: 1.23: 1.22: 0.75: 0.71 μm); width of first antennal segment 11 μm (n = 60, S.D. = 1.95 μm); AR = 1.11, S.D. = 0.12, ALAW = 2.29, S.D. = 0.29). Length of antennal segments of smallest instar (second) 13: 9: 2: 3: 3 μm (n = 22, S.D. = 2.40: 1.22: 0.79: 0.74: 0.79 μm); width of first antennal segment 8 μm (n = 22, S.D. = 1.05 μm); AR = 0.76, S.D. = 0.17; ALAW = 1.69, S.D. = 0.37.

Labial plate (Fig. 3B) with midteeth divided, each midtooth rounded apically, much wider than laterals (division not distinct on worn specimens). Five pairs of pointed lateral teeth.

Mandibles (Fig. 3C) with five teeth, progressively smaller from apical tooth to basal tooth. Basal tooth actually a dark area on the apical part of rounded basal section of mandible. Premandible (Fig. 3D) with apical end stout and broad, basal part or attached end convoluted.

Preanal papillae short, when present wider than long. Usually six bristles can be seen at apex of papillae (Fig. 3E); two bristles are shorter than the other four. The four longer bristles on the largest instar (fourth) about 300 μm long (n = 5); intermediate instar (third) 189 μm (n = 65, S.D. = 72.4 μm); and for the smallest instar (second) 136 μm (n = 11, S.D. = 37.6 μm).

Microscope slides were prepared for 149 individual specimens. Detailed measurements were made on 85 specimens. A total of 811 specimens of *Eukiefferiella* Alaska sp. I were estimated from 36 samples collected at 12 sampling sites.

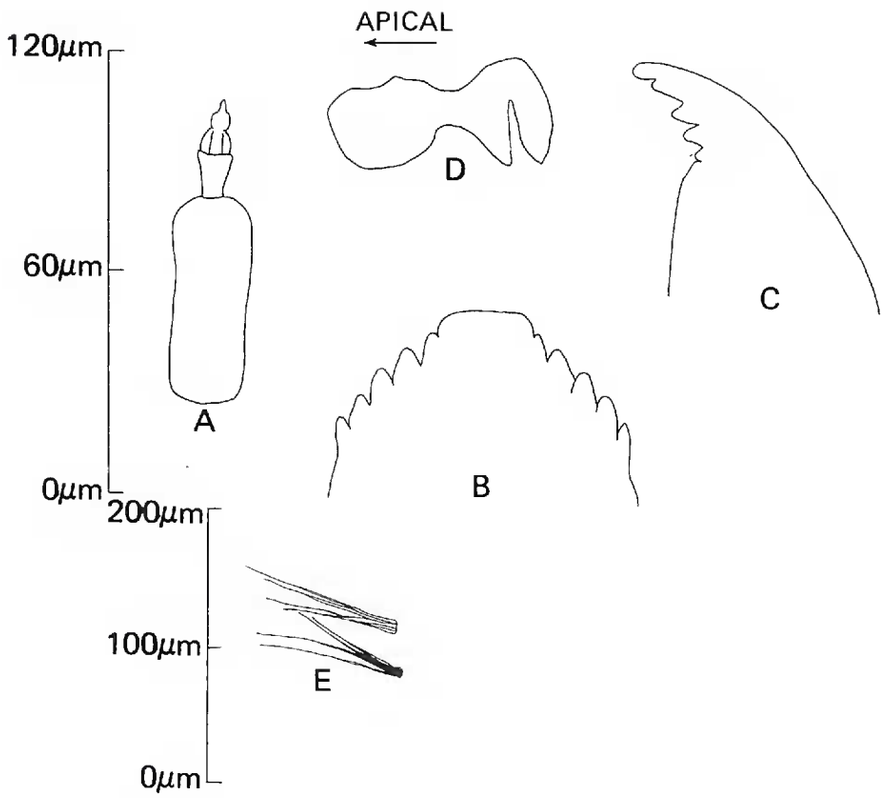

Fig. 4. *Eukiefferiella cynaea,* Thienemann. (A) antenna, (B) labial plate, (C) left mandible, (D) right premandible, (E) preanal papillar bristles.

Eukiefferiella cynaea Thienemann
(Fig. 4)

Larva, Thienemann 1936, in Thienemann 1954.

Three instars determined; body length of largest instar (fourth) 3.8–5.7 mm (average 4.73 mm, n = 6, S.D. = 0.66 mm); of intermediate instar (third) 2.0–4.0 mm (average 3.10 mm, n = 45, S.D. = 0.51 mm); and of smallest instar (second) 1.4–2.5 mm (average 1.93 mm, n = 11, S.D. = 0.41 mm). Head capsule of largest instar average 0.35 mm long and 0.25 mm wide (n = 6, S.D. = 0.028 mm and 0.055 mm); of intermediate instar, 0.22 mm long and 0.16 mm wide (n = 41, S.D. = 0.035 and 0.032 mm); and of smallest instar 0.18 mm long and 0.13 mm wide (n = 11, S.D. = 0.041 mm and 0.093 mm). Body color yellow to dark yellow or gray, some with banded appearance (this occurred on many specimens of several taxa where that part of an overlapping abdominal sclerite was darker than the remainder of the sclerite). Usually, specimens were darker dorsally. Head capsules light brown to brown.

Antennae of largest instar (fourth) (Fig. 4A), length of antennal segments 50: 11: 4: 5: 4 μm (n = 7: 6: 6: 6: 6, S.D. = 3.36: 1.63: 1.94: 0.41: 1.10 μm); width of first antennal segment 17 μm (n = 7, S.D. = 1.25 μm); AR = 2.01, S.D. = 0.20; ALAW 2.97, S.D. = 0.21. Length of antennal segments of

intermediate instar (third) 24: 11: 3: 4: 4 μm (n = 45: 42: 42: 42: 42, S.D. = 2.08: 1.03: 1.29: 0.07: 0.63 μm); width of first antennal segment 11 μm (n = 45, S.D. = 0.97 μm); AR = 1.13, S.D. = 0.177; ALAW = 2.23, S.D. = 0.26). Length of antennal segments of smallest instar 16: 10: 3: 4: 3.5 μm (n = 11, S.D. = 2.17: 1.13: 0.87: 1.0: 0.69 μm); width of first antennal segment 9 μm (n = 11, S.D. = 1.54 μm); AR = 0.82, S.D. = 0.136; ALAW = 1.83, S.D. = 0.213.

Labial plate (Fig. 4B) of practically all specimens had midtooth truncate (probably there were two teeth before wear) (Fig. 4B), some specimens with two teeth were otherwise very similar to those with truncate midtooth, so are placed in a single taxon. Truncate area 4 to 5 times width of base of lateral teeth. Five pairs of pointed lateral teeth present with first pair usually showing apical wear.

Mandibles (Fig. 4C) with 5 teeth, progressively smaller from apical tooth to proximal tooth; antennae about same length as mandibles. Premandibles (Fig. 4D) with apical end stout and broad, basal part convoluted.

Preanal papillae absent or nearly so. Four weak bristles present at papillae sites (Fig. 4E); 105 μm long (n = 7, S.D. = 25.3 μm) for largest instar (fourth); 90 μm long (n = 66, S.D. = 21.5 μm) for intermediate instar (third); and 85 μm (n = 11, S.D. = 22.8 μm) for smallest instar (second).

Microscope slides were prepared for 117 individual specimens. Detailed measurements were made on 84 specimens. A total of 581 specimens of *E. cynaea* were estimated from 36 samples at 12 sampling sites.

Eukiefferiella bavarica Goetghebuer
(Fig. 5)

Larva, Thienemann 1935, in Pankratova 1970.

Three instars determined; body length of largest instar (fourth) 3.4–6.0 mm (average 4.69 mm, n = 24, S.D. = 0.68 mm; of intermediate instar (third) 3.0–3.7 mm (average 3.38 mm, n = 12, S.D. = 0.22 mm); and of smallest instar 1.6–2.5 mm (average 2.20, n = 3, S.D. = 0.52 mm). Head capsule of largest instar average 0.36 mm long and 0.25 mm wide (n = 24, S.D. = 0.03 mm and 0.023 mm); of intermediate instar 0.30 mm long and 0.23 mm wide (n = 12, S.D. = 0.04 mm and 0.035 mm); and of smallest instar 0.18 mm long and 0.15 mm wide (n = 3, S.D. = 0.052 mm and 0.05 mm). Body color of preserved specimens light yellow during the first few weeks of storage, after storage with leaf and other detritus, light brown. Head capsules brown to dark brown.

Antennae (Fig. 5A) with first segment long compared to other *Eukiefferiella* taxa from these samples. Length of antennal segments of largest instar (fourth) 66: 14: 4: 6: 5 μm (n = 15, S.D. = 5.73: 1.79: 0.96: 0.86: 0.72 μm); width of first antennal segment 19 μm (n = 15, S.D. = 2.24 μm); AR =

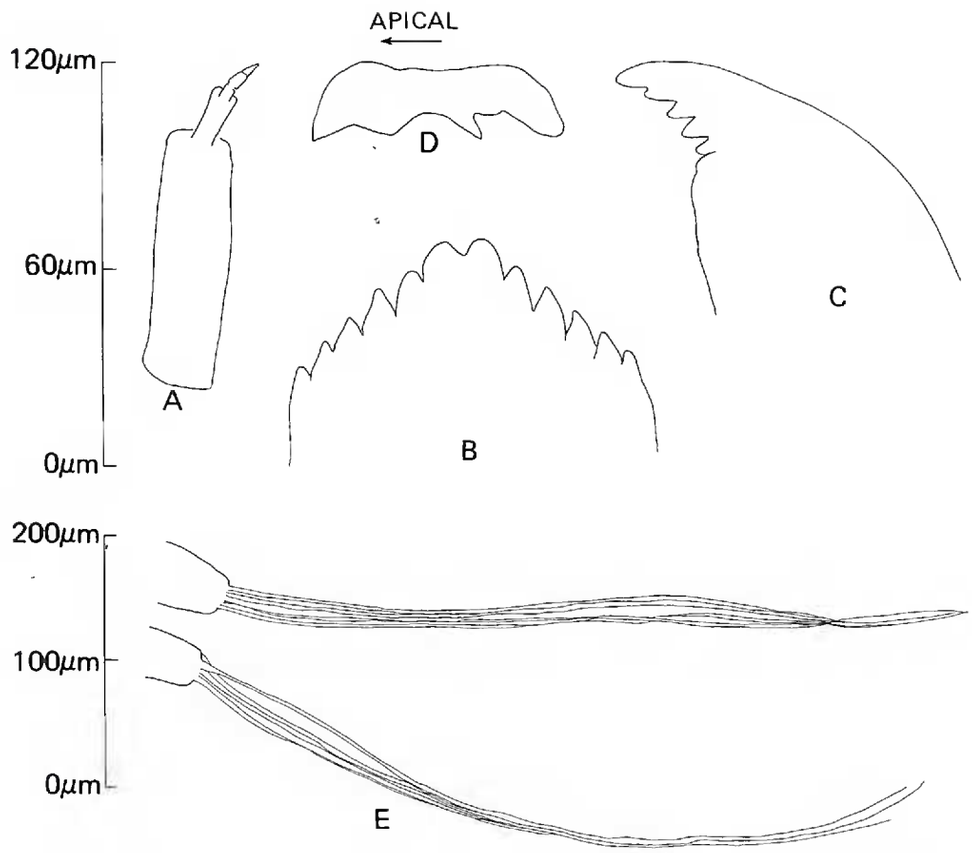

Fig. 5. *Eukiefferiella bavarica* Goetghebuer. (A) antenna, (B) labial plate, (C) left mandible, (D) left premandible, (E) preanal papillae and papillar bristles.

2.28, S.D. = 0.22; ALAW = 3.52, S.D. = 0.42. Length of antennal segments of intermediate instar (third) 44: 16: 4: 6: 4 μm (n = 12, S.D. = 6.06: 1.24: 1.16: 0.57: 0.72 μm); width of first antennal segment 16 μm (n = 12, S.D. = 0.75 μm); AR = 2.89, S.D. = 0.38; ALAW = 2.64, S.D. = 0.75. Length of antennal segments of smallest instar (third) 21: 12: 4: 4: 3 μm (n = 3, S.D. = 5.13: 1.53: 1.15: 1.0: 0.58 μm); width of first antennal segment 11 μm (n = 3, S.D. = 1.53 μm); AR = 0.88, S.D. = 0.26; ALAW = 1.92, S.D. = 0.22).

Labial plate (Fig. 5B) with two large midteeth, 2 to 3 times larger than lateral teeth. Five pairs of lateral teeth.

Mandibles (Fig. 5C) with five teeth progressively smaller from apical tooth to proximal tooth. Premandibles (Fig. 5D) apically stout and broad, convoluted at the base where attached.

Preanal papillae present (Fig. 5E) about as wide as long approximately 35 μm long and 37 μm wide. Six bristles attached to end of papillae (in largest instar, fourth) 600 μm long (n = 10, S.D. = 125.0 μm), one bristle attached to side of papillae 150 μm long (n = 8, S.D. = 37.8 μm). Apical bristles for intermediate instar (third) 330 μm long (n = 8, S.D. = 61.1 μm); and for smallest instar (second) apical bristles 230 μm long (n = 1).

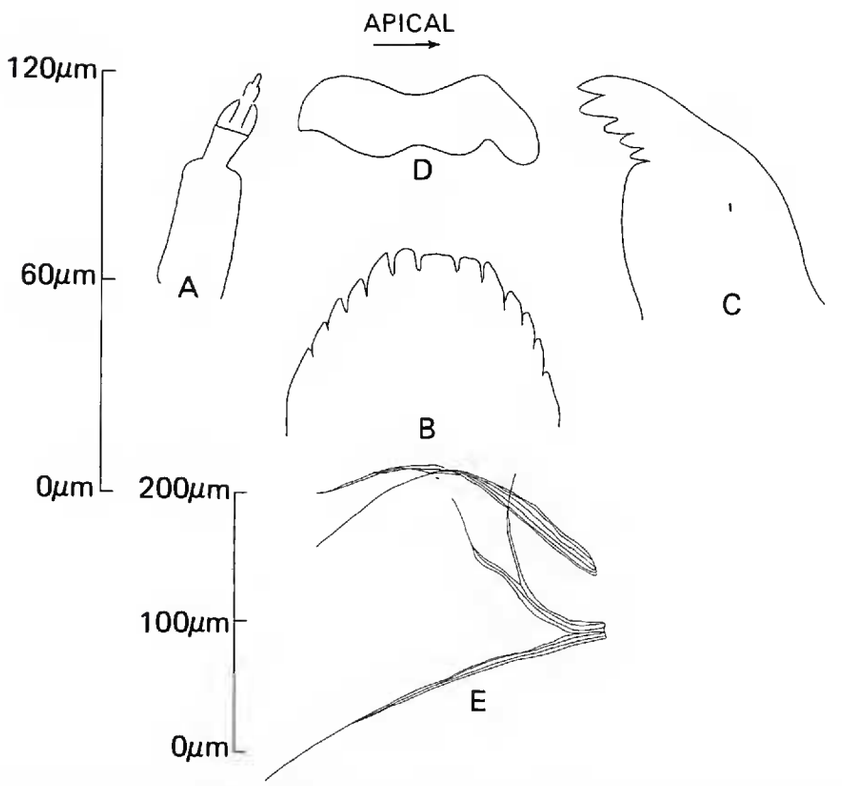

Fig. 6. *Orthocladius* (*Euorthocladius*) Alaska sp. I. (A) antenna, (B) labial plate, (C) left mandible, (D) right premandible, (E) preanal papillar bristles.

Microscope slides were prepared for 50 individual specimens. Detailed measurements were made on 39 specimens. A total of 139 specimens of *E. bavarica* were estimated from 36 samples collected at 12 sampling sites.

Genus *Orthocladius* Kieffer
Subgenus *Euorthocladius* **Thienemann**

Larva, as per O. A. Saether, written communication, 1973

Orthocladius (*Euorthocladius*) Alaska sp. I
(Fig. 6)

Three instars determined; body length of largest instar (fourth) 3.5–5.5 mm (average 4.5 mm, n = 4, S.D. = 0.90 mm); of intermediate instar (third) 2.3–3.0 mm (average 2.65 mm, n = 4, S.D. = 0.31 mm); and of smallest instar 1.5–2.8 mm (average 2.30 mm, n = 27, S.D. = 0.44 mm). Head capsule of largest instar average 0.26 mm long and 0.14 mm wide (n = 2); of intermediate instar, 0.24 mm long and 0.19 mm wide (n = 4, S.D. = 0.042 mm and 0.013 mm); of smallest instar (second) 0.21 mm long and 0.16 mm wide (n = 26, S.D. = 0.043 mm and 0.026 mm). Body color of preserved specimens light green or light yellow, later brown after storage with leaf and other detritus. Head capsules light brown.

Length of antennal segments of largest instar (fourth) (Fig. 6A), 34: 9: 6:

3: 4 μm (n = 4: 3: 3: 3: 3, S.D. = 4.35: 1.15: 2.0: 0.58: 0.58 μm); width of first antennal segment 18 μm (n = 4, S.D. = 4.24 μm). Length of antennal segments of intermediate instar (third) 23: 11: 3: 4: 4 μm (n = 4, S.D. = 1.71: 1.89: 0.96: 0.96: 0.58 μm); width of first antennal segment 12 μm (n = 4, S.D. = 1.41 μm). Length of antennal segments of smallest instar (second) 17: 9: 3: 3: 3 μm (n = 24: 24: 23: 23: 23, S.D. = 2.95: 0.66: 1.58: 0.54: 0.39 μm); width of first antennal segment 12 μm (n = 23, S.D. = 1.57 μm); AR = 0.93, S.D. = 0.175; ALAW = 1.41, S.D. = 0.18. Usually sessile Lauterborn organs are present, attached to apical end of second antennal segment and are as long as third antennal segment (Fig. 6A).

Labial plate (Fig. 6B) with midtooth ranging from about one and one-half to twice as wide as the first pair of lateral teeth. The midtooth and first laterals show wear before remainder of laterals, usually are set apart slightly and all three truncate. There are six pairs of lateral teeth.

Mandibles (Fig. 6C) with five teeth, progressively smaller from apical teeth to proximal teeth. Second tooth wider than first tooth, sometimes mandible teeth appear as two large teeth and three small teeth. Premandibles (Fig. 6D) apically with a single tapered lobe.

Preanal papillae absent, or nearly so. Six bristles present at papillae sites (Fig. 6E); 400 μm long (n = 2) on largest instar (fourth); 360 μm long (n = 4, S.D. = 80.1 μm) on intermediate instar (third) and rounded to 315 μm long (n = 24, S.D. = 67.4 μm) on smallest instar (second).

Microscope slides were prepared for 71 individual specimens. Detailed measurements were made on 34 specimens. A total of 785 *O.* (*Euorthocladius*) Alaska sp. I were estimated from 36 samples collected at 12 sampling sites.

Orthocladius (*Euorthocladius*) Alaska sp. II
(Fig. 7)

Two instars determined; body length of largest instar (fourth) 3.0–6.4 mm (average 4.15 mm, n = 11, S.D. = 1.19 mm); of smaller instar 3.5 mm long (n = 1). Head capsule of largest instar 0.33 mm long and 0.29 mm wide (n = 2). Body color of preserved specimens dark yellow-brown or brown, some with banded appearance.

Antennae (Fig. 7A) with first segment short and wide compared with other specimens from these samples. Length of antennal segments of largest instar (fourth) 28: 11: 3: 3: 3 μm (n = 12: 12: 11: 11: 11, S.D. = 2.61: 1.44: 1.19: 0.54: 0.65 μm); width of first antennal segment 21 μm (n = 11, S.D. = 2.91 μm); AR = 1.39, S.D. = 0.24; ALAW = 1.37, S.D. = 0.14.

Labial plate (Fig. 7B) with midtooth only slightly wider than lateral teeth. Margin of labial plate on these specimens concave. Nine pairs of lateral teeth present.

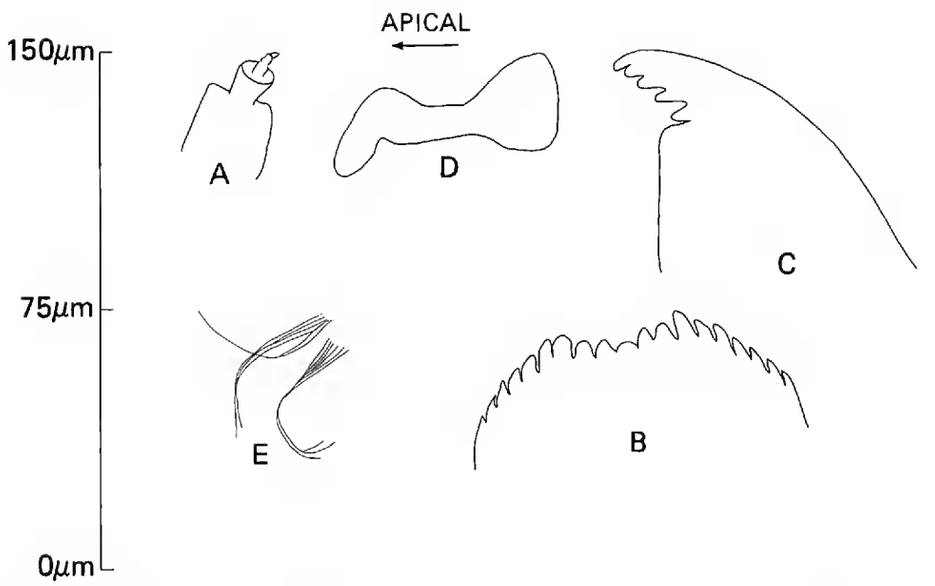

Fig. 7. *Orthocladius* (*Euorthocladius*) Alaska sp. II. (A) antenna, (B) labial plate, (C) left mandible, (D) right premandible, (E) preanal papillar bristles.

Mandibles (Fig. 7C), most showing wear, with teeth progressively smaller (about same size on worn specimens) from apical teeth to proximal teeth. Premandibles (Fig. 7D) slightly divided apically.

Preanal papillae absent; 4 pairs of weak bristles at papillae sites (Fig. 7E) average 90 μm (n = 7, S.D. = 17.3 μm) on largest instar (fourth); 50 μm (n = 1) on smaller instar (third).

Microscope slides were prepared for 26 individual specimens. Detailed measurements were made on 13 specimens. A total of 58 *O. Euorthocladius* Alaska sp. II were estimated for 36 samples at 12 sampling sites.

Orthocladius (*Euorthocladius*) Alaska sp. III (Fig. 8)

Only seven individuals were estimated from 36 samples collected at 12 sampling sites. Microscope slides were prepared and detailed measurements made on two specimens.

Both measured specimens were believed to be the same instar. Body lengths 3.5 and 4.6 mm. Head capsule of larger specimen 0.45 mm long and 0.32 mm wide. Body color of preserved specimens orange-brown and head capsule brown.

Antennae (Fig. 8A) for larger specimen with first segment was very wide and stout compared to specimens from other taxa in these samples. Length of antennal segments for the larger specimen 49: 7: 3: 2: 4 μm, width of first antennal segment 37 μm; AR = 3.06; ALAW = 1.32. Width of first antennal segment about three to four times wider than width of second segment.

Labial plate (Fig. 8B) with midtooth three to four times wider than lateral

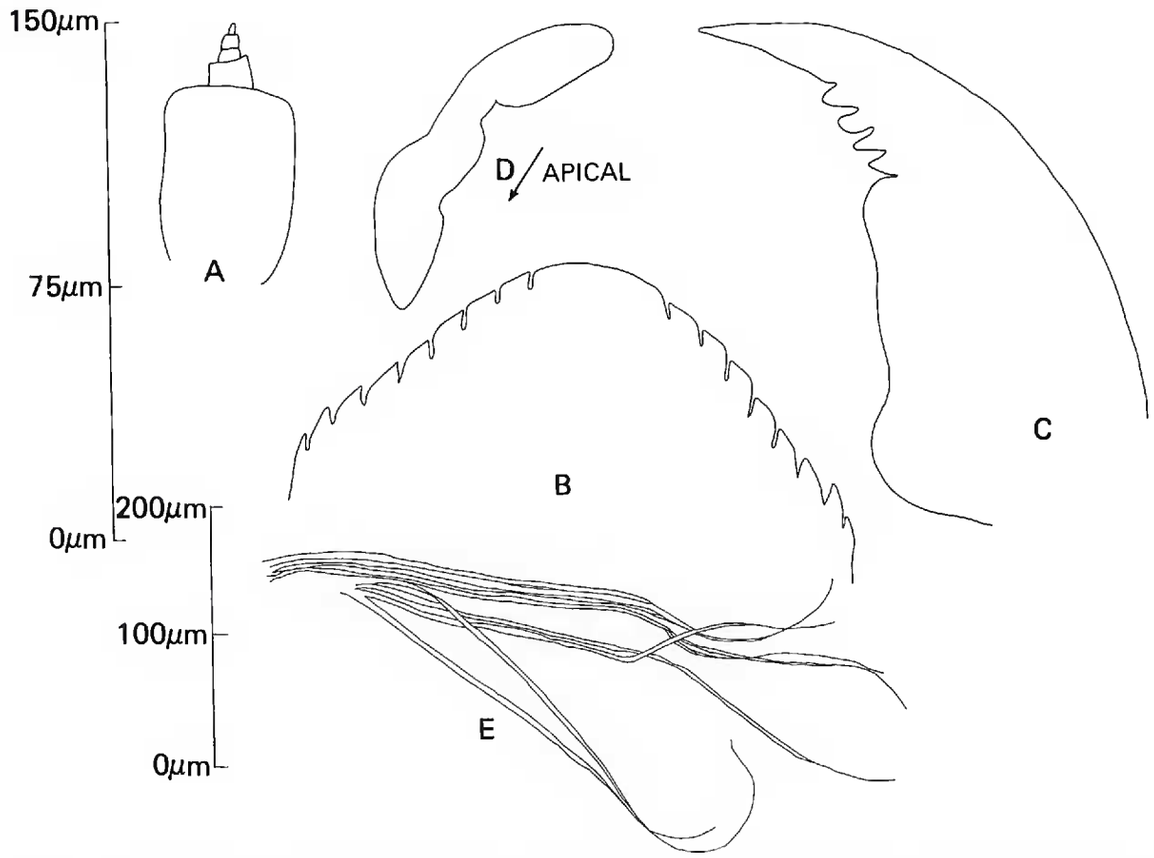

Fig. 8. *Orthocladius* (*Euorthocladius*) Alaska sp. III. (A) antenna, (B) labial plate, (C) left mandible, (D) right premandible, (E) preanal papillar bristles.

teeth. Nine pairs of lateral teeth. Margin of labial plate smooth, slightly worn with tips of lateral teeth pointed toward the midtooth.

Mandibles (Fig. 8C) with a very large, scythe-shaped apical tooth and four, much smaller, proximal teeth. Premandibles (Fig. D) a large tapered lobe apically.

Preanal papillae absent; 4 or 5 bristles (Fig. 8E) arising from each papillae site about 500 μm long.

Subgenus *Orthocladius* s.str.
(Fig. 9)

Information provided by Ole A. Saether, 1973

Two instars determined; body length of largest instar (fourth) 2.6–6.0 mm (average 4.67 mm, n = 31, S.D. = 0.77 mm); for smaller instar (third) 1.9–3.0 mm (average 2.46 mm, n = 9, S.D. = 0.37 mm). Head capsule of largest instar 0.41 mm long and 0.31 mm wide (n = 30, S.D. = 0.067 mm and 0.048 mm); and of smaller instar 0.24 mm long and 0.18 mm wide (n = 8, S.D. = 0.025 mm and 0.016 mm). Body color of preserved specimens yellow, yellow-brown, some with green tinge to other colors. Head capsules yellow, light brown or yellow-brown.

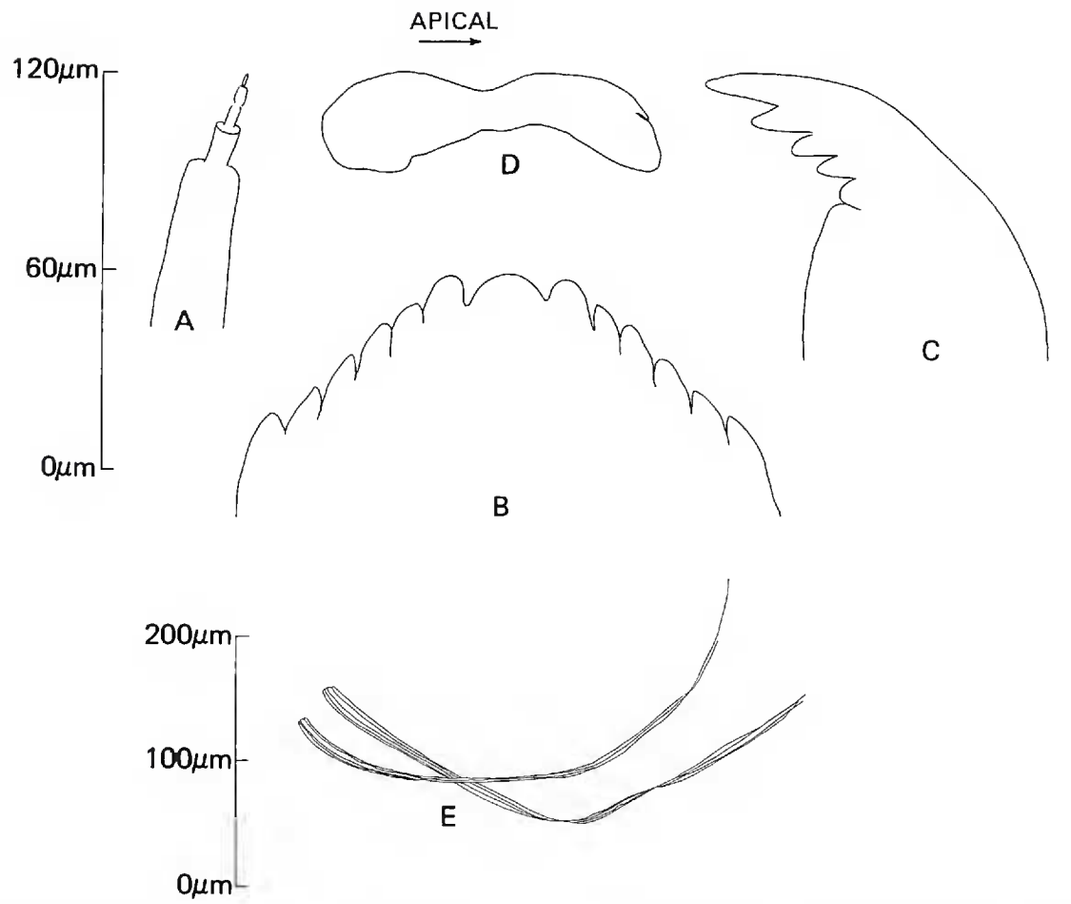

Fig. 9. *Orthocladius* s.str. (A) antenna, (B) labial plate, (C) left mandible, (D) right premandible, (E) preanal papillar bristles.

Antennae of largest instar (Fig. 9A) with segment lengths of 49: 14: 6: 5: 4 μm (n = 29: 28: 28: 28: 28, S.D. = 4.18: 2.25: 1.33: 0.99: 0.90 μm); width of first antennal segment 22 μm (n = 27, S.D. = 3.95 μm); AR = 1.77, S.D. = 0.258; ALAW = 2.30, S.D. = 0.387. Length of antennal segments of smaller instar 20: 9: 4: 3: 3 μm (n = 9, S.D. = 4.5: 1.50: 0.53: 0.33: 0.73 μm); width of first antennal segment 12 μm (n = 9, S.D. = 0.93 μm); AR = 1.07, S.D. = 0.103; ALAW = 1.73, S.D. = 0.438.

Labial plate (Fig. 9B) with a wide, rounded midtooth, two to two and one-half times as wide as lateral teeth. There are 6 pairs of lateral teeth, usually the first pair is slightly worn or rounded.

Mandibles (Fig. 9C) with 5 teeth progressively smaller from apical teeth to proximal teeth. Crenulations on the outer margin of the mandibles are prominent on some specimens, weak or absent on others. Premandibles (Fig. 9D), a tapered lobe with a small notch near apex.

Preanal papillae slight (Fig. 9E), always wider than long. Six bristles present at apex of each papilla; 485 μm long (n = 29, S.D. = 123.1 μm) on the largest instar (fourth); 320 μm long (n = 9, S.D. = 14.9 μm) on the smaller instar (third).

Microscope slides were prepared for 41 individual specimens. Detailed

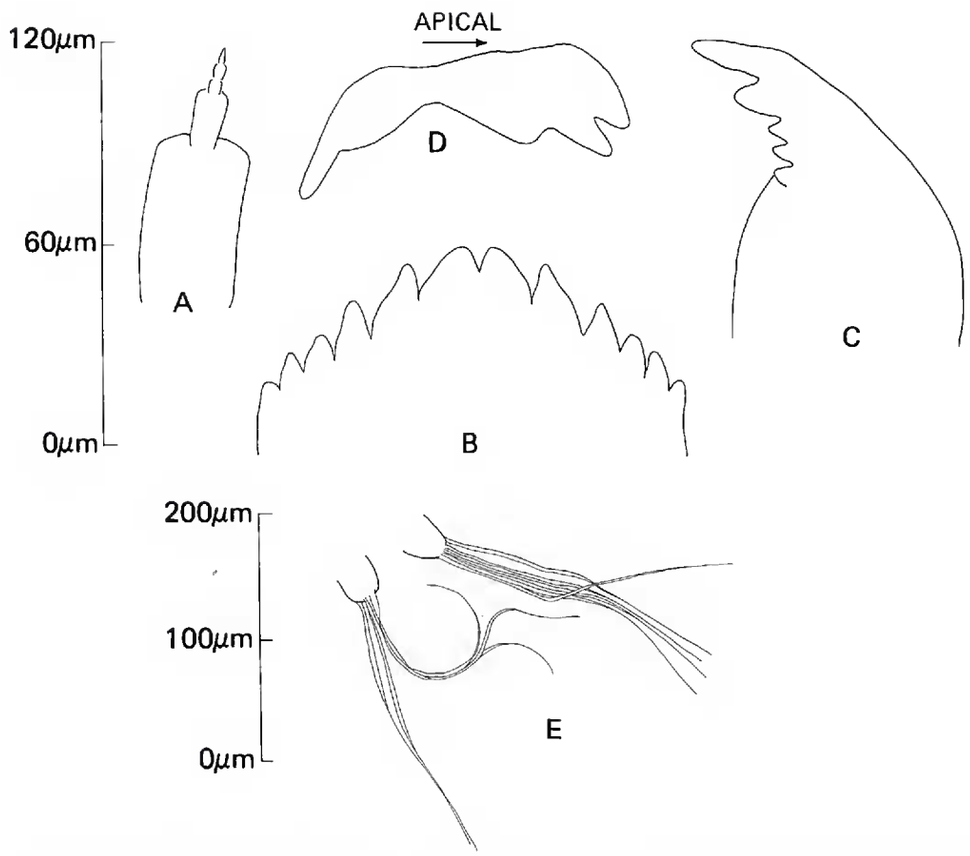

Fig. 10. *Chaetocladius* Alaska sp. I. (A) antenna, (B) labial plate, (C) left mandible, (D) right premandible, (E) preanal papillae and papillar bristles.

measurements were made on 39 specimens. A total of 103 specimens of *Orthocladius* s.str. were estimated from 36 samples collected at 12 sampling sites.

Genus *Chaetocladius* (Kieffer)

Larva, Thienemann 1921, in Pankratova 1970

Chaetocladius Alaska sp. I
(Fig. 10)

One instar determined (third or fourth) body length 3.0–5.4 mm (average 3.97 mm, n = 11, S.D. = 0.70 mm). Head capsule, 0.28 mm long and 0.20 mm wide (n = 11, S.D. = 0.057 mm and 0.041 mm). Body color of preserved specimens yellow-brown, and head capsule brown.

Antennae (Fig. 10A), each segment 36: 10: 5: 4: 3 μm long (n = 13: 13: 11: 11: 11, S.D. = 5.72: 1.55: 1.49: 1.21: 0.92 μm); width of first antennal segment 16 μm (n = 13, S.D. = 2.91 μm); AR = 1.56, S.D. = 0.32; ALAW = 2.23, S.D. = 0.45.

Labial plate (Fig. 10B) with 2 large, dark midteeth and 5 pairs of lateral teeth. Last pair of teeth nearly trilobed single tooth.

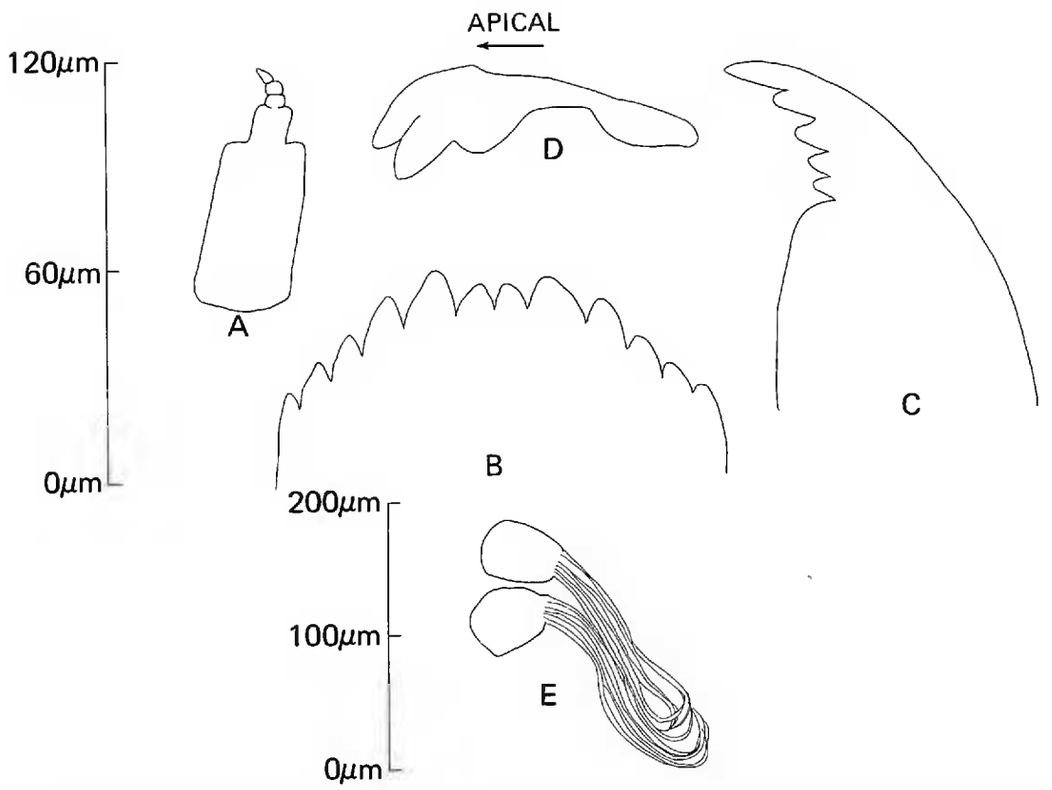

Fig. 11. *Chaetocladius* Alaska sp. II. (A) antenna, (B) labial plate, (C) left mandible, (D) left premandible, (E) preanal papillae and papillar bristles.

Mandibles (Fig. 10C) with 5 teeth, apical tooth large, second tooth one-half size of apical tooth and last three teeth much smaller. Premandible (Fig. 10D) with three lobe-like digits.

Preanal papillae (Fig. 10E) present, about as long as wide (20 μm long and 20 μm wide). Five bristles at apices of papillae, 325 μm long (n = 9, S.D. = 56.6).

Microscope slides were prepared for 15 individual specimens. Detailed measurements were made on 13 specimens. A total of 17 specimens of *Chaetocladius* Alaska sp. I were estimated from 36 samples collected at 12 sampling sites.

Chaetocladius Alaska sp. II
(Fig. 11)

Only a single specimen was taken from 36 samples collected at 12 sampling sites.

Body length of specimen 3.6 mm, head capsule not measured. Body color of preserved specimen banded, brown bands and brown-white between bands, head capsule dark brown.

Antennae (Fig. 11A) length of segments 45: 13: 3: 3: 3 μm; width of first antennal segment 25 μm; AR = 2.05, ALAW = 1.8.

Labial plate as in Fig. 11B. Two midteeth each only one-half as long as

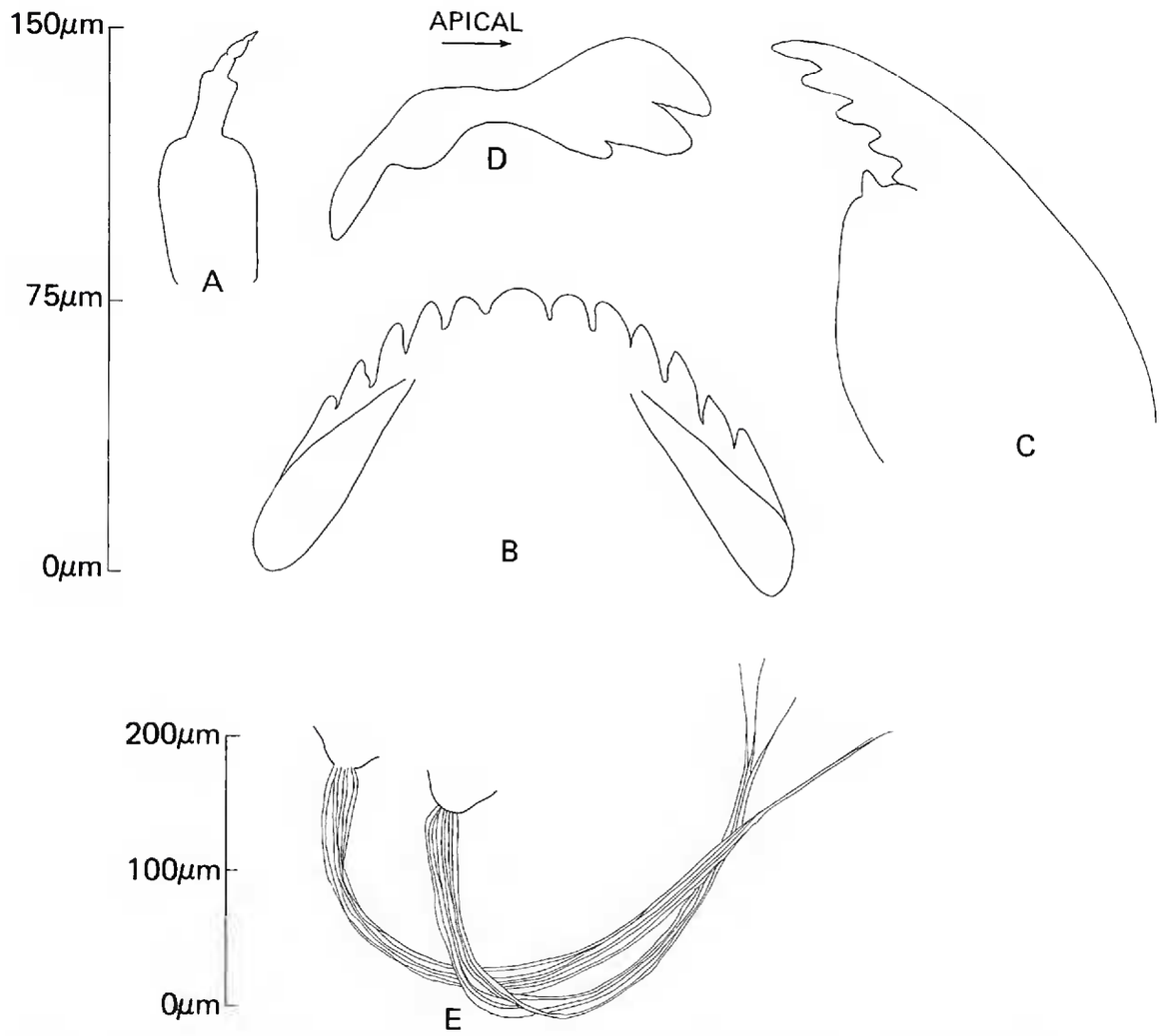

Fig. 12. *Parakiefferiella* Alaska sp. I. (A) antenna, (B) labial plate with paralabials, (C) left mandible, (D) right premandible, (E) preanal papillae and papillar bristles.

first or second pairs of lateral teeth. Five pairs of lateral teeth, last three pairs smaller than first two pairs.

Mandibles (Fig. 11C) with five teeth, apical tooth large and remaining four teeth small and progressively smaller from second tooth to proximal teeth. Premandibles (Fig. 11D) with two large tapered lobe-like digits with a lateral (mesad) bulge.

Preanal papillae (Fig. 11E) present, about as long as wide (32 μm long and 35 μm wide) with a robust appearance. Six pairs of bristles about 300 μm long.

Genus *Parakiefferiella* (Thienemann)

Larva, Thienemann 1936, as in Pankratova 1970

Parakiefferiella Alaska sp. I
(Fig. 12)

Only 11 individuals were estimated from 36 samples collected at 12 sam-

pling sites. Microscope slides were prepared for five specimens and detailed measurements made on two specimens.

Body length of five specimens 3.5–4.5 mm (average 4.0 mm, n = 5, S.D. = 0.5 mm). Head capsule 0.38 mm long and 0.28 mm wide (n = 2). Body color of preserved specimens yellow, head capsule yellow-brown.

Antennae as in Fig. 12A. Length of antennal segments 50: 16: 5.5: 3: 2.5 μm (n = 2); width of first antennal segment 29 μm (n = 2); AR = 1.85; ALAW = 1.72.

Labial plate (Fig. 12B) with a single midtooth one and one-half to two times wider than lateral teeth. Six pairs of lateral teeth present with paralabial plates beginning apically at outer base of second pair of lateral teeth to posterior of the base of the last pair of lateral teeth (paralabial plates not easily detected on these specimens).

Mandibles (Fig. 12C) with five teeth, progressively smaller from apical tooth to proximal tooth. Premandibles (Fig. 12D) with two tapered lobes.

Preanal papillae (Fig. 12E) wider than long (about 20 μm long and 32 μm wide). Four terminal bristles about 425 μm long.

Genus *Corynoneura* (Winnertz) Edwards, in Pankratova 1970

Larva, Pankratova 1970

Corynoneura Alaska sp. I
(Fig. 13)

Only 6 specimens of *C.* Alaska sp. I were estimated from 36 samples collected at 12 sampling sites, all specimens came from one site. One instar determined (third or fourth), body length 1.2 mm long (n = 2). Head capsule of a single specimen 0.14 mm long and 0.11 mm wide. Body color of preserved specimens yellow, head capsule light brown.

Antennae (Fig. 13A) with two annular organs, the first at midpart of first antennal segment and the second about three-fourths the length of first antennal segment from the base. There is a small spur-like blade about 4 μm long at apex of second antennal segment. Antennae with four segments, length of antennal segments 63: 47: 45: 2 μm (n = 2); width of first segment 17 μm; AR = 0.66; ALAW = 3.71.

Labial plate (Fig. 13B) with midtooth small, first pair of lateral teeth much larger than midtooth. Total of 6 pairs of lateral teeth, second pair smaller than third pair, and third pair almost as large as first pair.

Mandibles (Fig. 13C) with five teeth, first tooth smaller than second tooth. Third through fifth tooth progressively smaller. Premandibles (not illustrated) poor on both specimens, possibly divided into two lobes.

Preanal papillae short (Fig. 13E), 4 bristles at apex about 160 μm long. Spines, one group each at dorsal base of each proleg. Each spine group

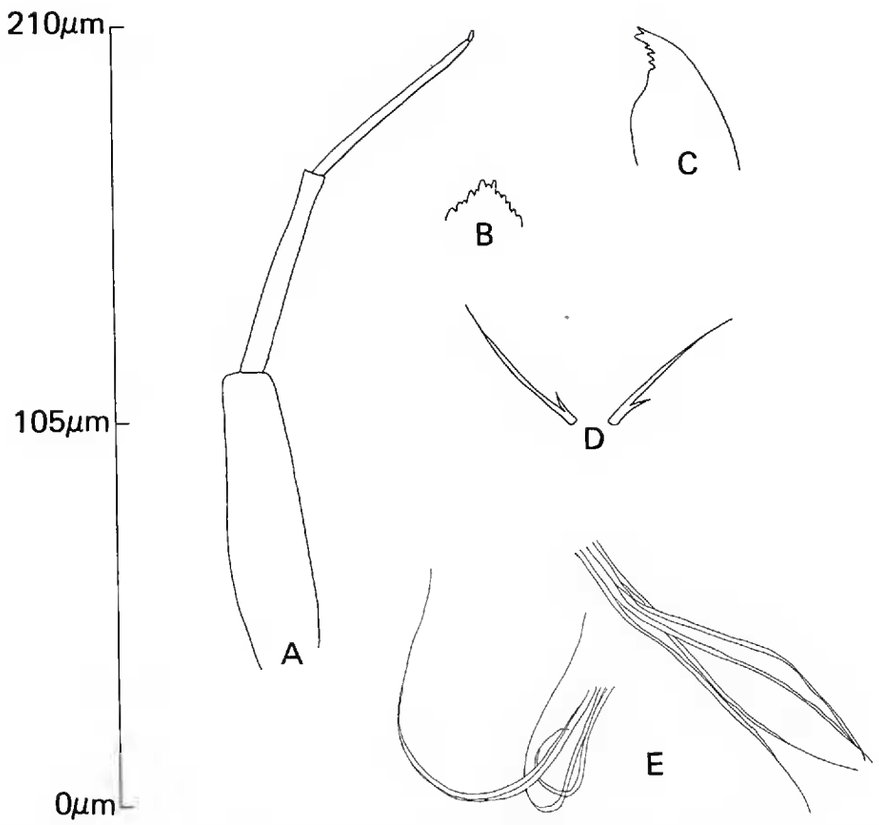

Fig. 13. *Corynoneura* unnamed Alaska sp. I. (A) antenna, (B) labial plate, (C) left mandible, (D) spines, of posterior prolegs, (E) preanal papillar bristles.

(Fig. 13D) with one long spine 48 μm long and a second spine (at base of first spine) 11 μm long.

Acknowledgment

Dr. Ole A. Saether of The Freshwater Institute in Winnipeg, Canada, identified representative samples of each taxon. Most of the drawings were prepared from specimens examined by him.[2]

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Footnote

[1] Mention of trade names or commercial products does not constitute endorsement by the U.S. Geological Survey nor recommendation for use.

[2] Dr. Saether is now Professor of Systematic Zoology at the University of Bergen, Norway.